Gas Journal

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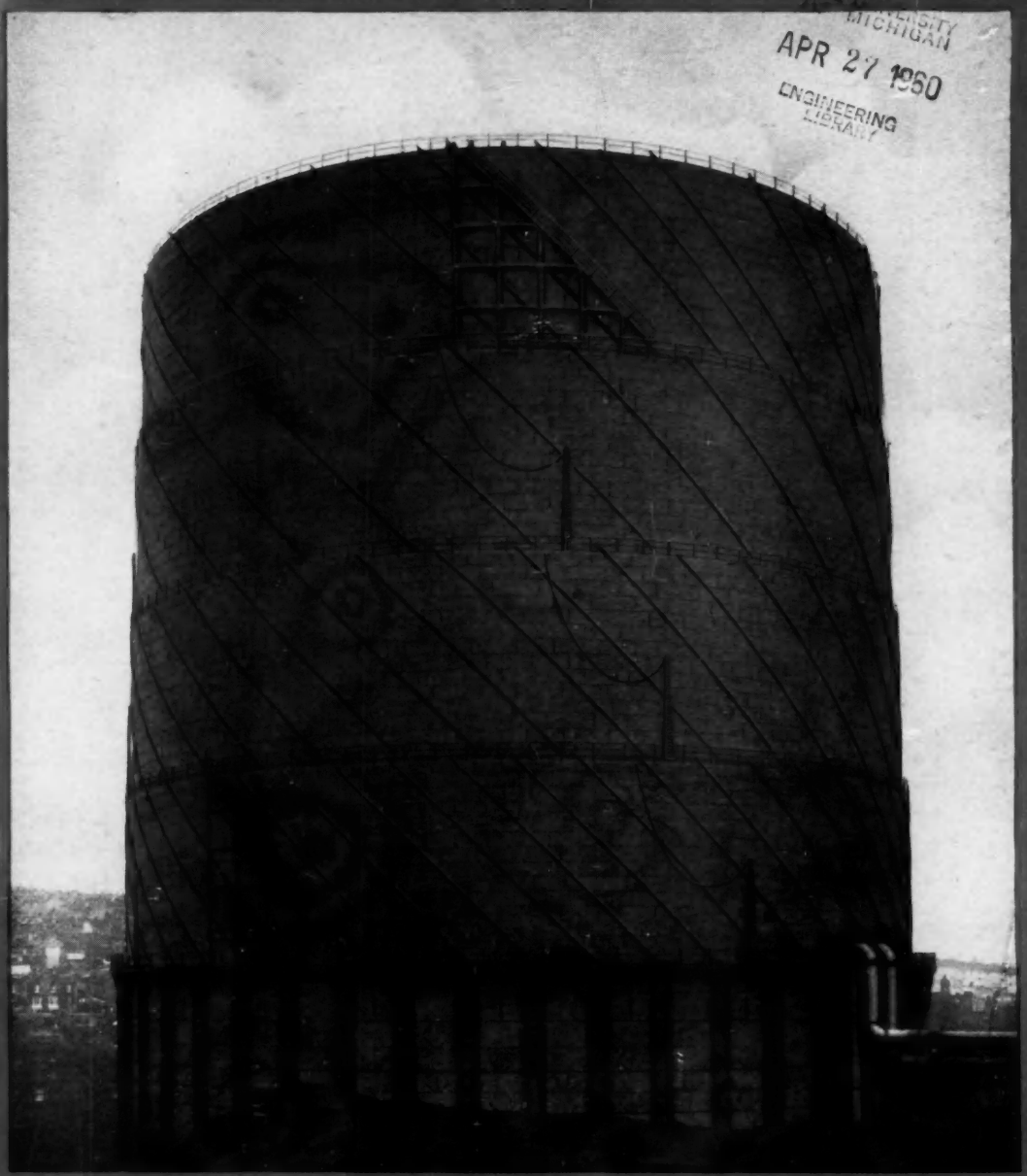

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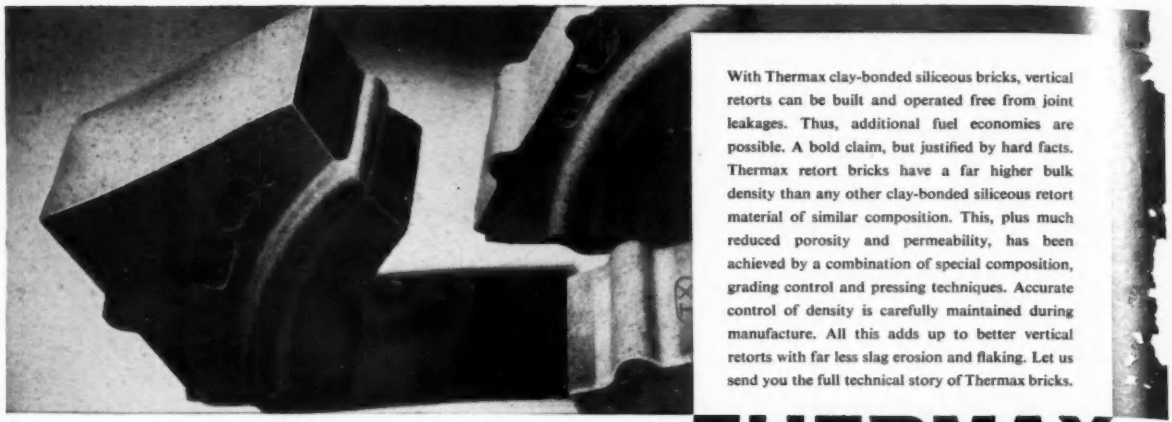

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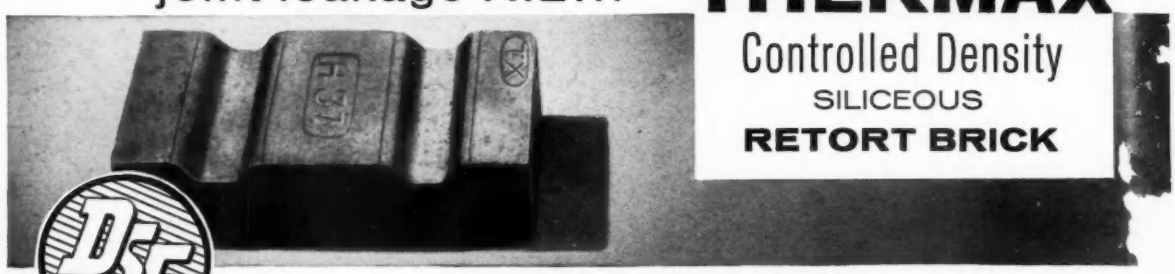

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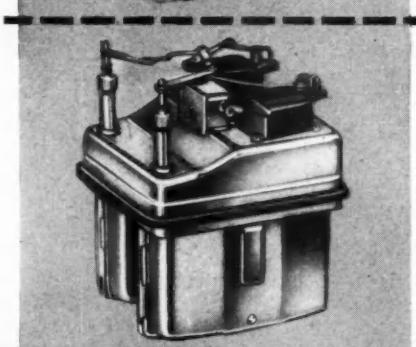

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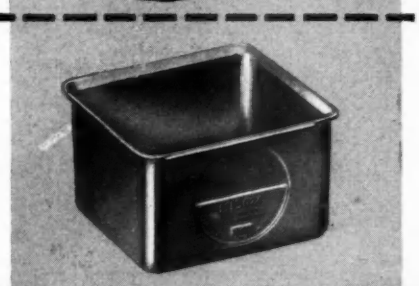

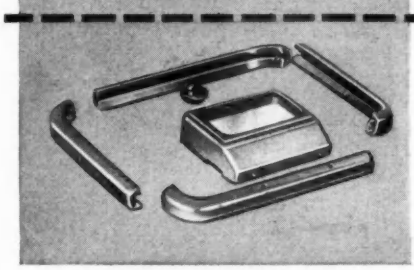

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Gas Journal

COKE OVENS • BY-PRODUCTS • CHEMICALS

The industry's strategic position

WE have from time to time expressed regret at the apparent failure on the part of some of those charged with the responsibility of shaping the country's industrial and fuel future to appreciate fully the vital part played by gas in the national energy pattern. Indeed, there was a time, during the earlier days of his reign as Minister of Power, when we voiced our misgivings of Lord Mills' appreciation of what the gas industry can and must do to preserve the proper balance between the four major fuel industries.

In the course of time those fears were somewhat allayed, and any lingering doubts finally dispelled last week when Lord Mills moved the second reading of the Gas Bill. In this he showed not only a keen appreciation of the fuel situation, but also a sympathetic understanding of the gas industry's own particular problems. In particular, he described what he called 'the strategic position of the gas industry in our fuel economy.' His appraisal of the situation was concise and fair, and part of it deserves to be quoted in these columns.

'The gas industry,' said Lord Mills, 'occupies a key position, but the industry has to meet severe and very vigorous competition, notably from the oil and electricity industries. Not only have the gas boards at least two adversaries, but they must also fight on two fronts, because at present and for a long time to come the industry will need to produce two fuels—gas and coke—as the production of coke and other solid smokeless fuels is likely to be a very important part of the business of area gas boards for a period which will stretch far beyond the time covered by this Bill.'

Turning to the controversial subject of liquid methane, Lord Mills commented: 'The experimental quantities so far imported by the small experimental ship, the "Methane Pioneer," are almost negligible, even compared with the total volume of gas sold by the North Thames Gas Board, which is the only Board to have used this material so far. These have been experimental cargoes and no proposals have yet been made to the Government for large-scale imports. It has been wrongly assumed that methane imports, if authorised, would be entirely at the expense of coal now being used for gas making. It is likely that if methane proves to be attractive it may also be a substitute for oil gas or an ideal enriching agent for lean coal gas. It may also help to retain markets for gas in areas remote from the coal fields which would otherwise be lost to the gas industry and thus to the coal industry. Cheap therms obtained from methane may enable gas boards to enlarge the market for gas and thus retain substantially unimpaired the outlet for gas produced by carbonising plants. I would suggest to your Lordships that until proposals are made for commercial imports, we should keep an open mind on the possible advantages and disadvantages which they might bring.'

Later the discussion turned to the price of gas with a question raised by Lord Dalton.

'I was rather surprised,' he said, 'to notice that nothing was said in another place by any speaker in any section of the House about the price of gas; that was left unmentioned. I suppose it seems obvious, and no doubt it is borne out by statistics, that the prominent factor in the price of gas must be the price of coal. But I remember that in ancient days, before the nationalisation of the industry, we used to hear about the so-called "gasworks clause." If I recall correctly, what this provided was that if a privately-owned gas company desired to increase its dividends to its shareholders, this was permissible only if there was a corresponding reduction in the price of gas to the consumer—and the old Gas Light & Coke Company, and others, worked on that basis for many years. I should like to know what is happening now in this field of the price determination of gas.'

To which Lord Mills replied: 'This question of prices and tariffs is a very important one. I think it must be obvious that the first duty of the gas boards, and of the Gas Council who look at their tariffs—which is a good thing, too—must be to see that the industry does not become a burden on the State. Therefore they have so to arrange their tariffs that they can sell the maximum volume of gas and coke and remain competitive, and I think the gas industry has done a good job in this respect. It is true that it has been up against the mount-

ing price of coal. That has enabled conditions in the mines to be better, but it has also affected the gas industry. What the gas industry itself has done in order to overcome these handicaps, I am sure reflects great credit on it. It has got rid of, or is getting rid of, large numbers of old gasworks and putting in modern plants and modern distribution throughout. I am glad to be in a position to say that.'

We too are glad he was in a position to say it, and also to add a word on coke prices which seemed to be a source of irritation to Lord Hawke. Lord Mills said that the relationship between the price of gas and the price of coke was 'a matter for the commercial judgment of the industry itself, and that is why it is always so important that whatever Government is in power will see that the management of those industries is first-class and qualified to exercise the best commercial judgment; because such matters require a very keen judgment, a very nice balance, of whether a little more should be charged for gas and a little less for coke, and *vice versa*.'

At the beginning of his speech the Paymaster-General put into words the 'fundamental question' which he thought he would be expected to answer: The output of the gas industry had been approximately static over the last few years, and it might therefore be supposed that the normal depreciation revenues of the industry should be sufficient to sustain the present and expected level of production. Why therefore must Parliament be asked to approve more borrowings?

Later he answered that question: 'The higher limits which we are now asked to sanction will provide for the completion of the modernisation of the industry and for the inception of new developments. The industry has been consistently modernising its efforts, reducing the number of gasworks, erecting better and modern gasworks, and giving a better service to the community.'

Thus the industry's progress is being more fully recognised in influential circles. We hesitate to say it, for fear of talking too soon, but gas has been registering rather well lately, hasn't it?

So few mechanical producers?

WE are publishing this week a paper by Messrs. E. Keast and N. Holder, Assistant Engineers at the Neepsend works of the East Midlands Board, on the large-scale manufacture of producer gas. The plant they describe is comprehensive and aims at delivering adequate quantities of cold, clean producer gas to the retort settings under the most efficient possible thermal conditions. It also makes available the additional quantity needed for dilution of the coal gas to the declared calorific value.

Altogether the plant consists of four units, each of which comprises a Gibbons-Heurty mechanical producer and the ancillary plants needed for cooling and dedusting the gas before it enters the setting. This ancillary plant includes a boiler, raising steam at 200 p.s.i., an economiser and a gas washer. Each unit of producer plant is designed for a maximum output of 360,000 cu.ft. per hour.

We found the authors' description of the plant, the difficulties they had encountered during commissioning, and the solutions they devised to overcome them most interesting. Of even greater interest, however, was the description of such a plant, principally because it brought to mind the tendency after nationalisation of installing mechanical producers in the large plants then being ordered to supply gas to the grid systems. It seemed as if such installations might become common practice, but in the light of subsequent events this does not appear to be so.

The size of plant described in the paper would seem to us to be about as big as the gas industry is likely to build, but clearly the coke oven industry might be interested in larger plants for underfiring to release more rich gas to the gas industry. Producer gas from hard coke is normally expensive and the sizes of coke generally used in the mechanical producer at the coke works might easily find a ready market elsewhere. Though unreactive, it is always clean and well graded, and the distribution of its ash makes it suitable for thermostatically controlled boilers and coke stoves. For this reason a special design of producer for gasifying breeze or small unwanted coke, or even small hard coal, might well take the place of the conventional mechanical producer at the coke works.

The mechanical producer does not seem to have been accepted with any great enthusiasm by the gas industry in the past. The early installations both in this country and on the Continent were of German design and manufacture. The first Koppers producer to be installed in Britain was at Blackwell colliery in Derbyshire in the late 1920's and a pair of medium sized mechanical producers formed part of the Koppers continuous vertical retort plant built at Whaley Bridge in 1929. The decision to build the coke oven plant at Beckton in the early 1930's would have introduced these producers to the industry on a large scale and subsequent batteries complete with their own producer plants must have done much to demonstrate how economically and reliably producer gas could be made by this means.

The manufacturers of water gas plants had developed the fully automatic 'labourless' sets over the years and for them to be complete and controllable by the one man allowed per shift for supervision only, the rotary grate ash extractor appeared as a 'must.' This had been developed and it was not surprising therefore that such manufacturers were offering mechanical producers after the war. In most cases, however, these plants made 'hot' producer gas.

Since the war, too, the importance of good working conditions in the retort house has become increasingly evident, especially because labour for cleaning out the built-in static producer was at one time becoming more and more difficult to obtain in certain areas. The dirt and smoke in some of the smaller works, many of which have since been closed down, caused many gas engineers to consider ways and means of turning the retort house into a kind of modern factory workshop. The installation of mechanical producers would have done much

to accomplish this. Even so, it is noteworthy how few mechanical producers have actually been installed by the industry.

In our own experience of inspecting works during recent years, during which time many new gas production projects have been completed, it is quite remarkable how few mechanical producer plants we have seen. There is no doubt that they are expensive, but they do offer a means of obtaining a clean producer gas of constant quality, therefore making possible constant flue temperatures with the minimum of supervision. This, we feel, is important, since too much supervision is expensive in labour, and too little may well be expensive in refractory failure or a fall in gas output through loss of heats.

Turning to the present paper, we are grateful to the authors for bringing to our notice some of the finer points to be aimed at when providing producer gas on this scale, and it would seem that they have had to obtain most of the 'know-how' necessary for success by their own efforts.

The carbonising plant at Neepsend is unusual and consists of horizontal chambers of a capacity greater than the old horizontal retort but much smaller than the coke oven. Plant heating, however, is more similar to coke oven practice in that there must be a 'change-over' period every half hour lasting about 64 seconds. During this period, pressures in the producers and the producer gas mains must not be allowed to build up. The mechanism described for preventing this and for giving the alarm if pressure changes in the plant attain dangerous proportions is most fascinating and is an example of how the designers of instrumentation and control gear are able to adapt their equipment for such special uses.

The paper, we thought, was most instructive and confirmed our own views of how great a menace the presence of dust can be in the gas from mechanical producers. On this very point, the 'hot' gas mechanical producers designed for the gas industry after the war may very well have failed. The elaborate cooling and cleaning plant needed to overcome this weakness may, we think, have deterred the industry from adopting them on the scale we might have thought of as probable.

Commentary on the News

Diplomacy at Dinnington

IT is not all beer and skittles being chairman of an area gas board, one of the principal difficulties being the fact that, ultimately, everything which happens in the area is your responsibility. And when the board becomes involved in a dispute which arouses public indignation the chairman is liable to find himself in the position occupied by Mr. R. S. Johnson last week, at the receiving end of the quick-fire probes of the B.B.C.'s 'Tonight' interviewer, Fyfe Robertson.

The reason for Mr. Johnson's unexpected television appearance was a spot of bother over the South Yorkshire village of Dinnington where the East Midlands Gas Board has erected an oil gasification plant. Local residents complained of noise—and with reason judging by the racket which almost muffled the conversation—dirt and smell. One resident claimed that she could neither eat nor sleep and had lost a stone in weight. A member of the Rural Council explained how their efforts to prevent the plant being built had come to naught. In fact it all followed the usual popular concept of State industry steam-rollering the rights of the common man.

In this rather hostile atmosphere Mr. Johnson was all urbanity and sweet reason. He explained that the demand for gas in the Sheffield and Rotherham Division was 'surging' and that the Board had filled up every piece of gas-making land. 'But surely,' interjected Fyfe Robertson, 'you did not have to build this plant 4 ft. from the garden gates?' There was no alternative with such a small site, replied Mr. Johnson smoothly, and went on to explain that the plant had increased the local output by 13% in 12 months.

The discussion hinged mainly on Mr. Johnson's contention that the protests had not reached him, which led Fyfe Robertson to the conclusion that the Board's lines of communication were not all they might be. 'When people want to complain,' smiled Mr. Johnson, 'let them apply direct to me; I am always willing to listen to them.'

It is not everyone who can stand up to the Robertson brand of craggy, shaggy insistence. Mr. Johnson survived it with distinction. Of course, having been a barrister helped.

New H.V.R.A. laboratory

'PREJUDICE about heating and ventilating dies hard in this country,' said Lord Hailsham, Minister for Science, when he opened the Heating and Ventilating Research Association's new laboratory at Bracknell last week. 'Central heating was equated for many years with the foibles of the foreigner. "There is nothing like an open fire," he said, smiling with our scorched faces and shivering down our frozen backs.'

Perhaps that is why, as the Association's Chairman said, this is a branch of engineering which is not at all spectacular so far as the general public is concerned. Let us hope that the activities of the new laboratory will make the public more appreciative of development work in this field.

Efforts by the heating and ventilating industry to start co-operative research to study these problems was encouraged by the Department of Scientific and Industrial Research and resulted in the formation late in 1955 of the Heating and Ventilating Research Council. Within four years the Council achieved full Research Association status, and membership now totals 270, including the Gas Council. A wide variety of research has been undertaken for the industry, now centred in the new laboratories at Bracknell after sheltering under the B.C.U.R.A. roof at Leatherhead. Much of this is concerned with the design of commercial and industrial installations, but some of the data collected will be relevant to domestic users. At present the work is concerned mainly with scientific and technological investigations, although the Association has started work on problems of productivity.

Three of the laboratory's major projects are investigations on intermittent heating, chimney design, and the reduction of noise in heating and ventilating systems.

Meeting a growing demand

in the United States

THE PRODUCTION OF ACETYLENE BY METHANE PYROLYSIS

By

Peter W. Sherwood

THE production of acetylene is at present on a strong upward curve, having risen, in the United States, from 180 mill. lb. per year in 1949 to 850 mill. lb. in 1959. Almost the entire impetus has come from chemical demand, chiefly from vinyl chloride—32% of consumption—acrylonitrile—16%—neoprene—27%—and vinyl acetate—8%. Part of the growth in these fields is offset by weakness in the acetylene market for welding purposes which is running into heavy competition from propane-butane mixtures and from electric welding methods.

As yet, the bulk of acetylene is produced from calcium carbide, its conventional source. However, the growing demand for acetylene by the chemical industries has been met in increasing measure by methane pyrolysis. It is estimated that natural gas is today the raw material for some 12 to 15% of acetylene produced in the United States. Total capacity for methane-derived acetylene, spread over five plants, is approximately 250 mill. lb. per year, equivalent to 28,000 mill. cu.ft. of natural gas.

The key to the economic feasibility of producing acetylene from methane is large plant size. Installations of this type call for high capital cost, ranging from $130,000 to $250,000 per mill. lb. annual capacity plus the cost of an oxygen plant. To obtain a reasonable payout, plants must be sized above 40 mill. lb. per year in most locations. Since acetylene cannot be economically shipped over large distances—even pipe-line-transmission is limited to a few miles—local consumption must be of a magnitude which can only be achieved by relatively few chemical plants.

The last few years have seen very extensive activity in the development of economic techniques for the manufacture of acetylene from methane and other petroleum hydrocarbons. In each instance, the principle of pyrolysis is the same: The hydrocarbon feedstock is heated to 1,400 to 1,450°C. and, following an exposure time of .003 to 0.1 seconds, it is quenched immediately to limit the occurrence of breakdown reactions which will destroy the desired product.

Three feasible methods

The pyrolysis reaction itself is highly endothermic—6,600 B.t.u. per lb. of acetylene from methane—and heat must be provided to cover these requirements. There are three technically feasible methods for imparting the heat needed to the process gas: (1) Use of an electric arc or spark, *e.g.*, the Huels and Schoch processes; (2) regenerative means in which the process gas is brought into contact with preheated surfaces, *e.g.*, the Wulff process and some combination ethylene-acetylene processes, and (3) partial combustion, where the hydrocarbon gas serves partly as feed gas and partly as fuel.

With one exception, *viz.*, at Huels in Germany, all plants for the production of acetylene from methane embody the partial combustion principle. Processes are available in which air serves as an oxidising agent, *e.g.*, Tennessee Eastman's two-stage reactor and the Phillips Petroleum Company's 'tangential reactor.' However, oxygen is employed predominantly as the oxidising agent. The disadvantage of oxygen is the need for an air separation plant, but this is generally offset: (1) By the higher thermal efficiency of methane pyrolysis by oxygen; (2) by the formation of a more concentrated product gas, from which acetylene recovery is less costly than from nitrogen-diluted streams; and (3) by the formation in such processes of a concentrated by-product synthesis gas, *i.e.*, the carbon monoxide-hydrogen mixture, which can serve as raw material for ammonia or methanol synthesis.

Leading among oxygen-methane pyrolysis processes is the method of B.A.S.F., employed today by six or seven plants in the U.S.A. and Italy. A similar method, developed by the Union Carbide Company, serves as an acetylene source in two sites—Texas City, Texas, and Ravenna in Italy. Most recently, considerable attention has been attracted by the process of Societé Belgique d'Azote (S.B.A.), now operated commercially at one installation at Carling in France.

Key differences between these various processes are the design of the partial combustion burner and the method employed for recovering acetylene from the burner gas in which its concentration is only 7 to 9 moles %. The following descriptions will point out the highlights of partial combustion processes which are commercially available for the production of acetylene from methane.

Avoiding pre-ignition

In the B.A.S.F. process, the feed is natural gas, which should be essentially free of carbon monoxide and hydrogen to avoid danger of pre-ignition. The oxygen is at 95% purity, *i.e.*, of 'tonnage oxygen' grade and the oxygen:methane feed ratio is controlled at about .65.

The two feed gases are separately preheated to 600°C. and the streams are joined in a specially designed mixing zone at the top of the burner in which the reaction takes

place. After passage through the reaction zone proper in the burner, the process gas is quenched by injection of water into the burner's lower section. The gases leaving the bottom of the burner at approximately 80°C. contain 7 to 9% acetylene, 6 to 7% of methane, with carbon monoxide and hydrogen making up most of the remainder.

This gas is water-scrubbed and filtered for the removal of soot, and is then absorbed in a water-soluble organic solvent (believed to be gamma-butyrolactone containing 2 to 5% of water). Gas coming off from the absorber is essentially free of acetylene.

The rich liquor is stripped at atmospheric pressure to remove carbon dioxide (overhead) and acetylene which is withdrawn as a side stream in 99.8% purity. The lean liquor, leaving the stripper bottom, contains some acetylene as well as its higher homologues—especially diacetylene—which are more soluble in the medium than is acetylene itself. These impurities are stripped from the absorber solution at 3 p.s.i.a. and 100°C.

Typical consumption

Commercial experience shows the following raw materials consumption per lb. of 99.8% acetylene as typical of the process:

Natural gas (for synthesis drives and preheat)	116 cu.ft.
Oxygen (95% basis)	5.2 lb.
Electric power	0.17 kWh
Steam	13.3 lb.
Cooling water	140 gal.

In this, as well as the other partial combustion processes, the burners are of proprietary design and constitute a key aspect in setting the operating efficiency of the plant. In the B.A.S.F. burner, the reaction area proper is separated from the mixing zone by a burner block which acts as flame arrestor. Through this burner block, the gases pass in small parallel passages at very high linear velocity in order to avoid flame strike-back. The high-temperature parts of the burner are made of refractory.

The key differences between the S.B.A. and the B.A.S.F. processes are the method of purification and the burner design. In the S.B.A. system's burner, too, the gas mixing zone is separated from the combustion chamber by a burner block through which the gases pass at high speed. A screen of water passes down the inner wall of the metallic combustion chamber in order to protect it from the high temperatures and to wash off carbon as it is formed. Downstream of the reaction chamber, water is injected through a quench ring which is adjustable in order to permit control over the reaction period in the burner.

Two-stage processes

The S.B.A. acetylene purification system starts out with the removal of CO_2 from the cooled reactor gases by amine scrubbing. This is followed by a cold methanol wash to remove aromatics and heavy acetylene homologues. The gas is then passed into a scrubbing column where acetylene and polymers are absorbed in liquid ammonia at atmospheric pressure. The acetylene is stripped from the rich liquor in a state of 99.8% purity, and the lean ammonia solution is distilled for the regeneration of the solvent.

Several two-stage processes have been designed in which either air or oxygen may serve as an oxidising agent. Most of these processes are carried out in two stages. A fuel gas is burned with its stoichiometric equivalent of air or oxygen with a preheat of 600°C. and a flame temperature of 2,000°C. is reached in the combustion chamber. Further downstream, methane (or other fuel gas) is injected into the hot flue gas; heat is thus imparted to the process gas by the sensible heat of the combustion gas. Following a short residence in the reaction zone, the gas product is quenched and processed for acetylene recovery

Processes in this category are of particular interest for cracking higher hydrocarbons, *i.e.*, ethane to light naphtha, which are amenable for higher conversion to acetylene and to simultaneous ethylene and acetylene production. These higher hydrocarbons are, however, more costly than methane. Advantage is therefore taken of the two-stage approach which permits use of a lower-cost fuel gas since the process hydrocarbon and the fuel may be different materials.

Plant under construction

Two-stage processes have been developed, among others, by Tennessee Eastman, by Phillips Petroleum and by Hoechst. The latter company is now building a plant based on its two-stage process, rated to produce 100 mill. lb. of acetylene and ethylene per year.

The various burners which have been developed for acetylene production from natural gas hydrocarbons may be integrated with a number of different recovery systems. The usual approach calls for absorptive methods. In addition to butyrolactone and liquid ammonia, mentioned above, useful solvents for this service include dimethyl formamide, acetone, acetonyl acetone, dimethyl sulphoxide, etc. At least two processes have been designed in which acetylene is recovered from dilute reaction gas by 'hypersorption,' *i.e.*, by adsorption on activated charcoal in a continuous countercurrently moving bed.

FRANCE'S DETECTOR FOR BURIED GAS PIPES

TO find a buried gas main or set of mains is often difficult in the absence of a sufficient indication of its situation. Electromagnetic detection is sometimes useful but the apparatus must be specially adapted to this problem. Apparatus of the mine detector type is not suitable for a variety of reasons; it only detects magnetic bodies buried at a relatively small depth, it reacts to all magnetic bodies however small, and it is often heavy. The principal difficulty with the magnetic mine detector is its low sensitivity in depth and its incapacity to distinguish the particular gas main sought from other metallic bodies or other pipes buried in the vicinity.

These difficulties disappear if the receiver is sensitive, not to the modification of a magnetic field created by the apparatus itself but to a field created by the buried pipe. It is on this principal that the Gaz de France detector, first described to the A.T.G. in 1950, is based. New apparatus, improved in several points, is now available.

The apparatus, now described in the February issue, pp. 52-55, of the *Journal des Industrie du Gaz*, consists of two elements, an emitter sending an alternating current into the buried pipe, and a simplified radio-goniometer sensitive to the magnetic field produced in the pipe. The mathematical principle is set out in the paper with diagrams and a photograph of the instrument which is constructed by Sadar, 36, rue de Maroc, Paris XLX^e. Examples of its successful application are given in the paper.

GAS JOURNAL April 13, 1960

From a paper to the Yorkshire Junior Gas Association.

Large-scale manufacture of cold, clean producer gas

By E. KEAST and N. HALDER,

ASSISTANT ENGINEERS,
NEEPSEND WORKS, EAST MIDLANDS GAS BOARD.

IT is intended to describe an external producer gas plant for the firing with cold, clean producer gas of three batteries of horizontal chambers, each designed to produce 3.3 mill. cu.ft. of coal gas per day and to supply up to 1.5 mill. cu.ft. per day of producer gas for dilution purposes.

The system of heating of the carbonising plant is unusual for 'horizontals' in that the batteries are regenerative with ½-hourly reversal of flow as in coke oven heating. This reversal of flow leads to complications in the design of the producer gas plant, as will be shown later in the paper.

The producers are of the Gibbons-Heurtey type designed in four units each with a maximum capacity of 360,000 cu.ft. of producer gas per hour. No more than three of these will be needed to fire the three batteries, leaving one unit always as stand by. Each unit is complete with its own gas-cooling boiler, steam superheater, economiser, and gas cooling/scrubbing towers. Ancillary plant common to all four units includes producer gas boosters, oil washing equipment, and filter towers for the final stages of cleaning.

At the present time two batteries of carbonising plant are completed and at work. The foundations of the third battery are completed, and erection has commenced. Two producers are at work, and a third is available as stand by. The fourth producer gas unit is awaiting modification to the gas cooling boiler.

The producers are of the Gibbons-Heurtey type and each designed for a maximum output of 360,000 cu.ft. per hour, is 10 ft. in diameter.

Control of ash-bed conditions

Each is equipped with a self-clinkering grate, jacket boilers working at 20 p.s.i., automatic blast-saturation temperature control and automatic rotary coke-feeder. Air is supplied from air blowers, and a pressure of 3 in. w.g. is maintained at the producer outlet. The self-clinkering grate is driven by a constant speed electric motor through a variable chain reduction gear, with a fairly wide speed range. Clinker is crushed, and ash and clinker pushed outwards into the ashpan by the square-shaped bottom casting which turns slowly with the ashpan, and on to which the grate rings are fixed. The grate cap houses a thermo-couple, which together with the 'dips' taken through the six air screened poke-holes in the producer top, gives adequate information to ensure good control of the ash-bed conditions.

The conditions on the grate are controlled by the grate speed and the depth of the plough. To remove more ash from the perimeter of the producer ash-bed and yet leave it on the cap, the plough is lowered, and the grate speed kept the same; but to remove more ash from the cap without altering its depth at the perimeter the speed is increased without altering the plough position.

Immediately below the jacket boiler there is a further water-cooled section through which boiler-feed water is circulated. Water surplus to the requirements of the jacket boilers returns to the feed water storage tank, which also feeds the gas cooling boilers.

Light maintenance

The skirt-plate is bolted to an extension of the producer inner shell, and experience has shown that wear is quite rapid on the lower 9 in. of this extension of the boiler shell. To reduce the rate of wear—as well as to replace lost thickness—a 9 in. wide band of hard-facing has been formed by welding on this particular section. Apart from the replacement of one set of grate rings and two grate caps and the hard-facing, maintenance of the producers has so far been light.

The blast saturation temperature is automatically controlled by a Drayton motorised valve, the steam being supplied from the works 20-p.s.i. steam line into which the jacket boilers feed.

The rotary coke feeders are compact and simple in design and operation. Coke is charged virtually continuously at the impulse of a probe situated at the desired level of the fuel bed. The breaking of the probe contact starts the feeder, and remaking it stops it; in this way a constant fuel bed depth is maintained.

Unfortunately wear on the feeder drum and associated parts is so rapid that after only a very short period of service it becomes virtually impossible to keep the feeders gas-tight, and conditions on the operating stage and on the coke bunkers above, tend to deteriorate. An extractor fan has been fitted as a temporary measure to overcome this problem, while consideration is being given to modification in design.

Since clean producer gas was needed for this particular heating system of the carbonising plant, the transference of the sensible heat of the gas directly to the combustion chambers was out of the question. It was therefore decided to compensate for this by fitting gas-cooling boilers (with associated superheaters and economisers) to each producer.

Each of these is a Spencer-Bonecourt-Clarkson vertical fire-tube boiler comprising a water drum 6 ft. 3 in. in diameter by 9 ft. 6 in. long between tubes plates, and a separate steam/water drum 3 ft. 6 in. diameter by 9 ft. 6 in. long. The gas inlet is above the top tube-plate and the working pressure is 200 p.s.i. Necker continuous blow-down valves are fitted, and provision is made to collect

the blow-down flash-off steam at 20 p.s.i. and for the recovery by heat exchange of the remainder with boiler feed water. Two Tricone heaters are fitted to each boiler for warming up when putting to work or maintaining pressure on a boiler during a standby period. Any dust deposited in either a boiler or its economiser is removed through wet seals.

The economisers are of the horizontal gas flow Foster type with gilled tubes installed in the first two units; but because of heavy dust deposits, plain tubes were fitted in the third and fourth units.

Steam from the gas-cooling boiler passes through a Melesco horizontal, self-draining superheater fitted in a chamber between the producer offtake main and the gas-cooling boiler inlet. A baffle wall immediately before the superheater elements is intended to promote deposition of dust from the hot gas. This dust drops into a pocket which can be isolated by interlocked Westwood & Wright valves.

The flow of producer gas through the steam raising plant after it leaves the producer itself, is through the superheater into the top of the vertical cooler-boiler and from the outlet of this boiler through the economiser into the cooling/scrubbing towers. A fact which soon became apparent was the importance of a far higher standard of gas tightness in the construction of such units, especially the superheaters, when applied to gas-cooling than when applied to waste gases under vacuum conditions; an application with which the manufacturers of such plant are no doubt far more familiar. The units originally erected at Neepsend were far from satisfactory in this respect.

After only a short period of operation, the No. 1 unit began to show an increased resistance to gas-flow through the boiler and to a smaller degree through the economiser. The unit was shut down and investigation revealed a heavy dust deposit. Approximately 90% of the boiler tubes were either completely or partly blocked at the top tube-plate, and the build up in the economiser was estimated at 75%. Several factors might have contributed to this blockage, the chief of which were the proportion of fines in the fuel, the rate of gas flow, and the depth of fuel bed—in the early days of operation, the producers were not worked with a 'full' bed.

Measurements of the dust deposited in the superheater, boiler and economiser were begun, and Table 1. gives typical figures when a No. 3 coke, graded to 90% between 1¼ in. and ½ in. and containing 1.3% volatile matter and 7.3% ash was being gasified.

TABLE 1

Date January, 1958	Dust collected in lb. per hour (D.B.)			
	Superheater	Boiler	Economiser	TOTAL
14th ..	5·2	5·2	6·0	16·4
15th ..	5.1	5.5	4.1	14.7
16th ..	6·2	6·5	5·3	18·0
17th ..	6·3	2·6	7·6	16·5
18th ..	6·6	4·0	6·4	17·0
19th ..	7·4	4·5	7·1	19·0
20th ..	8·3	4·7	9·8	22·8

A sizing analysis of the dust from the boiler seal showed 97% through a 1-mm. screen and a similar sample from the economiser seal 99%. Table 1. shows that only a third of the dust collected came from the superheater.

A test was devised to compare the working of producer with a 'full' bed with one working with a 'low' bed. Table 2. shows the results of this test for the dust collected from the superheater only.

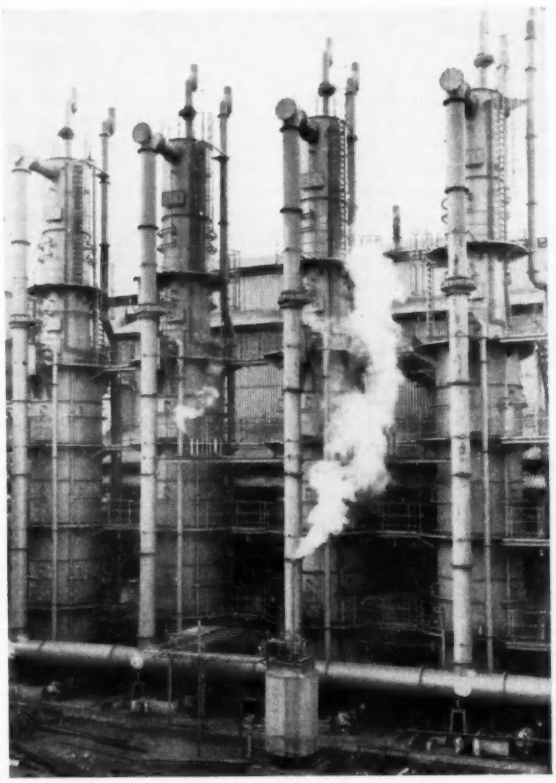
TABLE 2

	Date March, 1958	Dust from superheater		
			Total	Ratio
No. 1 unit ..	11th to 14th	80.38 lb	162.28	1
Full bed. ..	14th to 18th	81.90 ,,		
No. 2 unit ..	11th to 14th	194.04 ,,	532.62	3·3
Low bed. ..	14th to 18th	338·58 ,,		

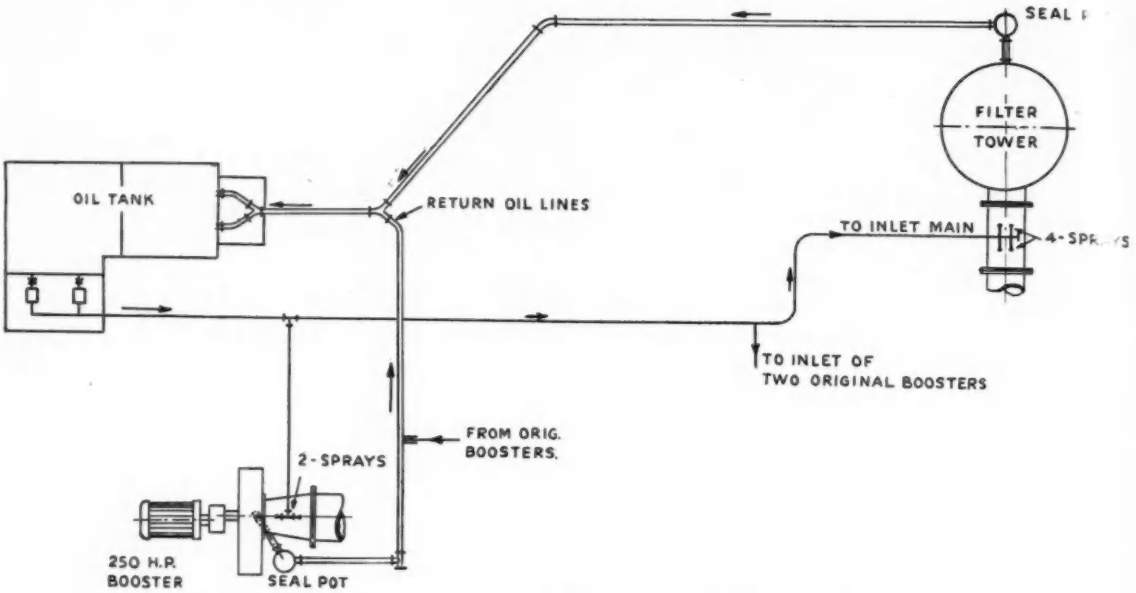
The 'full' bed was clearly filtering out considerably more of the dust than the 'low' bed, the ratio being 1 : 3.3 in favour of a 'full' bed; the producers have since been worked 'full.' Experience has shown that if each unit is not worked below 50% of its full load, if the percentage of fines in the fuel is kept low, and in particular, if the producers are worked with 'full' fuel beds, units can be worked for fairly long periods without difficulty.

It became apparent in the early days of operation of the Nos. 1 and 2 units that there was a marked instability of water level in the gas-cooling boiler, the water oscillating continuously from the top to the bottom of the gauge glass. This was cured by increasing the size of the water circulating pipes between the steam/water drum and the water drum from 3 in. to 4 in., altering their point of entry into, and extending the feed-water inlet inside, the steam/water drum. The feed-water inlet was taken to the bottom of the drum and extended along its length with slots opposite the ends of the water circulating pipes in an attempt to improve the water circulation.

Only a short time after starting up a serious leakage developed at the top tube-plate of the cooling boiler on the



External view of the producer gas plant showing cooling/scrubbing towers.



A diagram of the oil washing circuit on the producer plant at Neepsend works.

No. 2 unit; several tubes were found to be leaking badly. All the 300 tubes, were re-expanded into the top and bottom tube-plates. A short time afterwards a similar leakage occurred in the cooling boiler of the No. 1 unit. Clearly there was something in the design of the boiler and the operating conditions under which it worked that was responsible for these failures.

In order to start up the producers again it was decided, with the approval of the boiler insurers, to weld the tubes to the top tube-plate. This has proved effective so far and there has been no more of this trouble from these two units. When No. 3. unit came to be erected the tubes were similarly welded at the outset.

By the time the No. 4. unit was ready to be erected, the modifications to the water circulation had proved effective so one more trial with expanded tubes was made. Repeated failure after only a short time at work, showed that the inherent fault was still there. The tubes were then welded as in the other units.

Explanation of failure

The explanation of the tube failure was found to be that steam trapped under the top tube-plate, tends to insulate it from the water, and so permits it to become overheated. Possible design measures envisaged are to insulate the top tube-plate by fitting stainless steel ferrules and filling in between them with a 4-in. thickness of castable refractory, and to fit four 3-in. risers from the tube-plate to the steam drum in place of the existing two 1½-in. risers.

After about five months' work a superheater element of the No. 2 unit began to leak. Examination showed that the element had worn through in one place, caused by the impingement of dust carry-over in the gas. This failure has also appeared in Nos. 1 and 3 units, the wear always being in the same place. The bank of tubes in question has been fitted with loosely fitting wearing sleeves to prolong their working life.

On leaving the economiser the gas passes into the bottom of the primary cooling/scrubbing tower (10 ft. in diameter by 45 ft. high) in which it passes upwards counter current to water from three sets of Ledward & Beckett sprays. Super-imposed on the primary tower is a secondary tower of smaller diameter (6 ft. 6 in. in diameter by 30 ft. high), also fitted with similar sprays, up which the gas passes.

Water from the secondary cooler is recirculated through the primary cooler before being discharged to waste. Approximately 8,000 gal. of water per hour is used on each tower. The secondary cooling tower discharges the gas into a common manifold from which it is picked up by a booster and delivered to the inlet of a filter tower. This tower consists of a vertical cylindrical vessel, 9 ft. in diameter by 28 ft. high, fitted with two layers of cast-iron grids, on each of which rests a layer of raschig rings.

Water sprays are fitted above the bottom layer only, and the top layer of rings are left dry. Gas passes upwards through the tower and from the outlet. The bulk passes to the carbonising plant.

In the early days of the operation of the plant, there was a dust burden in the 'clean' gas of 50 grains per 1,000 cu.ft., a figure which was not satisfactory. Quite apart from the serious dust deposit which might occur in the regenerators of the carbonising plant, the pitching up of the producer gas boosters, mains and venturis was causing trouble and back-pressure began to build up across the filter tower. At one time the boosters needed cleaning every two weeks.

Unsuccessful attempts at improving the dust burden of the gas were made by putting two layers of coke 2 ft. deep in the secondary tower and one layer in the primary tower. Since these layers tended to increase the back-pressure and restrict the output of the producers, they were reduced in thickness, and eventually removed altogether.

Other modifications were the use of different types of water spray, and the fitting of gas and water deflecting plates in the cooling/scrubbing towers, but no improvement could be claimed.

While these experiments were going on, the raschig rings in the filter tower had to be renewed because of back-pressure and the dirty rings were found to be very difficult to clean. It was at this stage that a decision was taken to go ahead with the installation of oil washing

equipment as recommended by Gibbons Bros. Ltd. and used in France on similar plant.

In the system adopted, two sprays, each designed for 55 gal. per hour at 40 p.s.i., were fitted at inlet of the booster so that oil is entrained into the booster with the gas and intimate washing takes place. The quantity of oil that can be admitted at this point is limited by the overloading of the booster motor. In addition, four sprays were fitted in the inlet gas main to the filter tower, each rated at 300 gal. per hour at 40 p.s.i. The use of water sprays in the filter tower was discontinued leaving this vessel to act as a final drier and not a scrubber. The oil is recirculated after draining back to a collecting tank. Winter grade wash-oil supplied by the Yorkshire Tar Distillers is used.

Oil washing has now been carried out for approximately 12 months, and the present system for producer gas cleaning may be summarised briefly as follows:—

1. Partial arresting of grit at the superheater inlet.
2. Water scrubbing in the primary and secondary towers.
3. Oil washing in the booster and at the inlet to the filter tower.
4. Final filtering through two layers of raschig rings in the filter tower.

Since oil-washing began there has been a marked improvement in the cleanliness of the producer gas. Table 3 compares monthly average tests of dust and tar content without oil-washing, with similar tests for corresponding months with oil-washing. Table 4 gives the properties of the original wash-oil circulated, and shows how such properties change during use. Some emulsification of the oil with moisture from the gas takes place and better results are obtained when washing with emulsion than with fresh oil. However, recent experience has shown that too high a viscosity causes back-pressure in the filter tower, so viscosity testing will now become a regular feature of control.

TABLE 3
Comparison of (dust + tar) content in clean producer gas with and without oil-washing.

	Monthly average dust + tar tests			
	Without oil washing 1958		With oil washing 1959	
	Grains per 1,000 cu. ft.	Tarry matter %	Grains per 1,000 cu. ft.	Tarry matter %
March	42·33	—	23·80	78·1
April	26·51	61·8	21·36	50·1
May	50·60	69·6	26·42	41·4
June	54·20	77·0	14·45	44·1
July	54·10	60·5	15·17	54·1
August	65·20	—	25·07	60·0
AVERAGE ..	48·8	67·2	21·0	55·1

Variation in properties of circulating oil during use.

The wash-oil is partly renewed after about two months when washing 17 mill. cu.ft. per day of producer gas, and this procedure is supported by the analysis of sample 6 in Table 4, which shows no further increase in residue or sludge content after 66 days.

The half-hourly reversal of flow through the regenerative heating system of the carbonising plant brings with it difficulties in control, not frequently encountered in the operation of external producers on gasworks.

There is a period of 64 seconds at each reversal when producer gas is shut off completely from any one battery. With only one battery at work the demand for producer gas is reduced at each reversal for this period of time to only the small quantity required for dilution purposes. Similarly with two batteries at work producer gas requirements are reduced at each reversal to about a half, and with three batteries to $\frac{2}{3}$ for 64 seconds.

The equalisation of pressure throughout the producer plant is maintained by Evershed and Vignoles automatic controllers.

Jet-pipe principle

The general layout of the equipment consists of five controllers, which work on the jet-pipe principle of the relay type governor, in common use in many works.

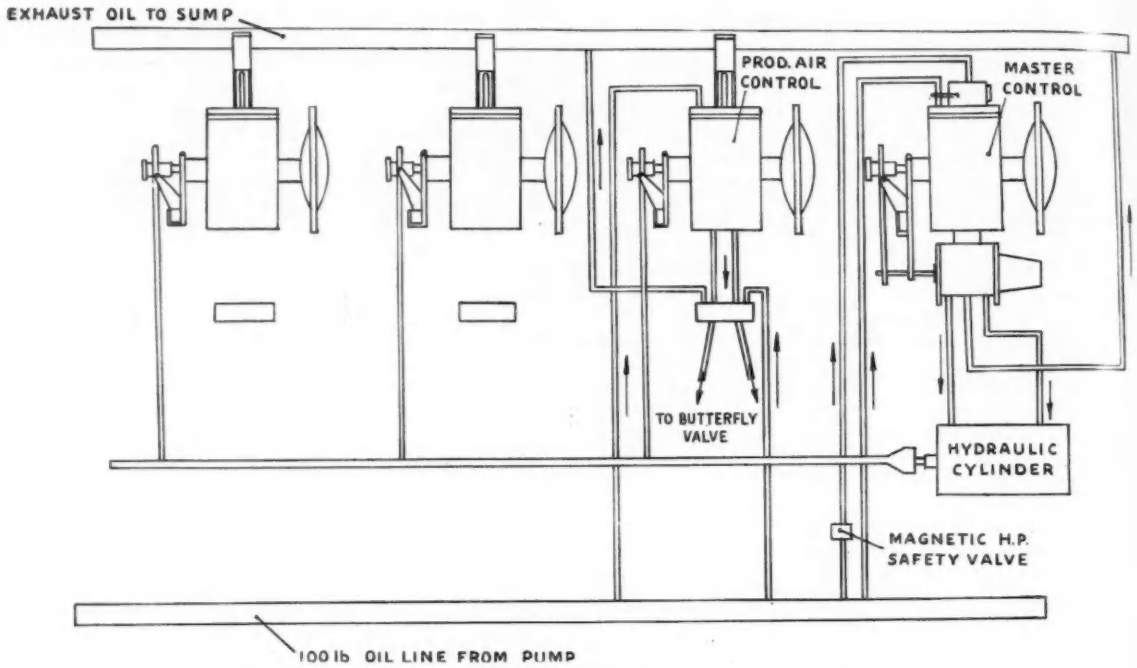
The 'master' controller maintains a constant pressure at the outlet of each producer. The other four units, are air flow controllers, which maintain the requisite volume of air to each producer irrespective of the pressure condition across the fuel bed. The master controller receives its impulses from a common header pipe connected across each producer gas outlet. As pressure conditions vary, the controller actuates a hydraulic piston, which is mechanically linked to the four air flow controllers. Any movement of the piston will thus vary the air flow to the producer.

The air flow controllers receive their impulses from venturi meters, installed in the air mains feeding each producer. If the pressure across a fuel bed increases, the volume of air passing will tend to decrease. The air flow controller will then operate the butterfly valve in the air main, and increase the under-grate pressure. This will bring the air flow back to its original volume.

Any fluctuation therefore in demand for producer gas, which will affect the producer gas outlet pressure, will cause the master controller to over-ride the flow controller and maintain the original pressure condition. When a reversal takes place the pressure in the cross-over main will tend to increase because of the reduced demand; the air controllers will respond and reduce the gas make to the desired level. In addition a hydraulic safety seal connected into the booster outlet main will vent away any excess gas and so prevent a pressure being thrown back on to the producer. At Neepsend this system of control

TABLE 4
Variation in properties of circulating oil during use

Sample No.	1	2	3	4	5	6
Description of sample	Original oil	After 20 days	After 29 days	After 60 days	After 66 days	After 85 days
% H_2O	*Nil*	25·0	25·0	23·0	13·0	2·7
% Middle oil (200° to 230°C)	4·0	*Nil*	8·0	4·0	1·1	0·8
% Heavy oil (230° to 270°C)	27·5	14·7	12·0	6·9	6·7	2·5
% Anthracene oil (270° to 360°C)	62·0	70·6	65·7	73·6	74·4	79·0
Residue	6·5	14·7	14·3	15·5	17·8	17·7
Sludge content (grams/100ml.)	—	—	0·79	2·7	4·2	4·0
Sp. Gr.	1·076	1·064	—	1·086	1·092	—



A diagram of the hydraulic controller unit on the producer gas plant

has eliminated the necessity for a separate producer gas holder as is often installed at coke oven works.

Safety controls are fitted to the plant to protect it against (a) low pressure in the air main, (b) low pressure in the producer gas cross-over main, connecting the producer gas plant with the carbonising plant and (c) a complete power failure.

If the pressure drops in the air main, a pressure operated electric switch will trip out the producer gas booster motor, and at the same time, open 200-p.s.i. steam jets, capable of inducing air to each working producer. The repeater panel on the operating stage will light up indicating Air Pressure Failure. The steam jets are normally kept closed by a solenoid operated valve. When the electric power energising the solenoid is cut off, the valve will then automatically open.

When an abnormally low pressure occurs in the producer gas cross-over main, a pressure operated switch at this point will cut out the dilution gas booster—this booster takes its supply from the cross-over main—and the repeater panel will then indicate Gas Pressure Failure, and a warning siren will sound.

The emergency steam jets supplying air to the producers are only intended to maintain a safe condition in the unit, and because the demand from the battery is greater than the supply, the pressure in the cross-over main will drop. When this happens the second series of controls will operate. In practice there is a time lag of five to ten seconds between the two functions.

When there is a complete failure of electric power, the solenoid operated steam jets supplying air will come into action, until the plant is shut down by hand.

As already indicated, the primary object of the safety control system is to maintain pressure conditions throughout the unit in the event of a breakdown. It also gives the personnel concerned 'breathing space' before proceeding with the next operation.

The producer gas plant and the batteries are in effect one complete unit, so co-ordinated action between personnel on both plants is essential if a failure occurs. Operators on the battery receive audible warning of a low gas pressure condition and will immediately cut off the power supply to the gas reversing gear, turning it by hand into the neutral position and so closing all producer gas valves feeding the heating flues. The producer gas operators will then be informed, and they will then, and only then, shut their units down. In the near future it is intended to install telephones on the battery and producer gas plant.

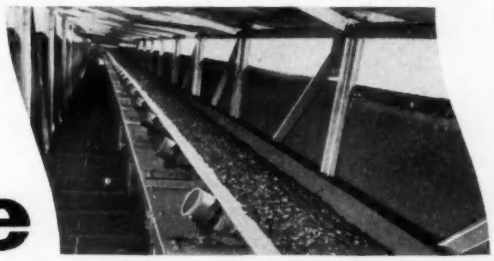
Manpower distribution

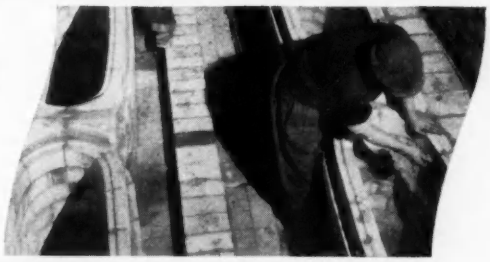
Three men per shift are employed on the plant; there are two top operators and one bottom man. The top operators' duties include the hourly logging of the various temperature, pressure and flow conditions indicated on the graphic instrument panel. Every hour the producer clinker levels are checked, by inserting pokers through the poke-holes, and noting the depth of clinker on the grate cap and the level of clinker at a point directly below the poke-holes. The grate speed and plough position are then adjusted if necessary to maintain the clinker level 8 in. above the grate cap and 8 in. below the cap, at a point vertically in line with the poke-holes. Any blow-holes that are observed are filled in by pushing fresh coke over with a poker. The general condition of the fuel bed is noted, and any hard patches immediately broken up with heavy pokers. The top operators are also responsible for the supervision of the boiler unit.

The bottom man's main task is the removal of ash and clinker deposited into skips from the producer ash-pans. The skips are loaded on to an electric hoist and emptied into an overhead ash hopper. Once per shift he cleans out all wet and dry seals, and keeps under observation all the pumping equipment installed at ground level.

A recent test carried out on the producer plant showed a hot gas efficiency of 89.7% and a cold gas efficiency of 75.1%; to the latter a further .8% may be credited for surplus steam.

Plant Maintenance





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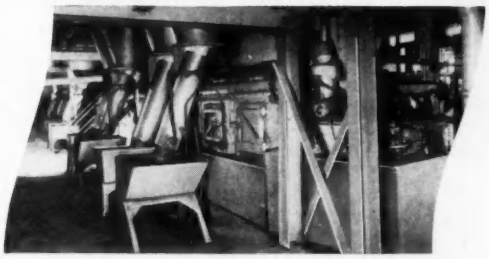

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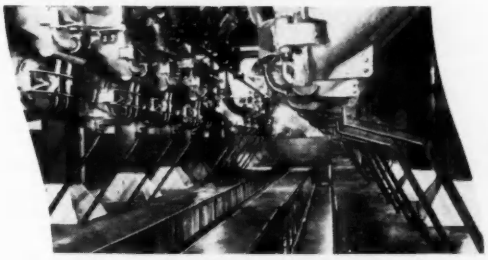

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GAS JOURNAL April 13, 1960

From a paper to the Yorkshire Junior Gas Association, Wakefield, January 16.

Simplified heat control of I.V.C. settings

By J. SMITH,

TECHNICAL ASSISTANT, CAR HOUSE WORKS, ROTHERHAM, EAST MIDLANDS GAS BOARD.

THERE appear to be two extremes of thought on the heat control of retort house settings. One is, over supervision and the excessive alteration of conditions, the other is very little supervision and rule of thumb method. The first is costly in labour and the second can be disastrous in terms of damaged settings, both of the brickwork and the ironwork.

In this paper an attempt has been made to take a middle course by which reasonable supervision has been combined with safety for normal operation and for the unusual conditions that exist in the Sheffield and Rotherham areas. Here, at weekends and holidays, it may be necessary to extend carbonising periods from 10½ hours to anything up to 18 hours, to change from producer gas to coal gas for heating the settings, or to empty the chambers completely from two to 14 days.

The complete carbonising plant at Car House, Sheffield, comprises 126 Woodall Duckham 3¼-ton intermittent vertical chambers in six benches, each of 21 chambers, but for the purpose of this paper, only two benches will be considered.

All the settings are fully recuperative and are designed for heating either with producer gas generated from coke in Humphreys and Glasgow producer gas plants, or with coal gas. The producers are large enough to supply sufficient gas for dilution of the incoming coke oven gas and the gas from the intermittent vertical chambers. Each bench is complete with a waste heat boiler capable of raising 5,150 lb. of steam per hour at 200 p.s.i.g. and superheated to 600°F.

Standby mechanical producer

Two mechanical producers of 9 ft. internal diameter are in use out of a group of three; the third being kept as standby for repairs, etc. Each producer is supplied with a hot gas dust separator and a sand sealed valve is provided at the outlet of each dust separator for quick isolation of each producer. Spectacle valves are fitted in the conduit from the outlet of each separator and in each leg of the conduit from the outlet of No. 2 producer. An Askania automatic gas pressure regulator is provided and controls the conditions in the producer gas mains, by operating a butterfly valve in the blast main.

Two rectangular steel cased firebrick lined flues take the producer gas from the manifold of the three producers. A flue runs alongside each bench at floor level and its size diminishes as it goes away from the producers; it has six neckings.

The fuel gas necks convey the producer gas from the main flue to the settings. Each neck is provided with two dampers. Individual control dampers are placed above and in front of the necks and regulate the amount of producer gas passing through the nostrils to the bottom combustion flues. The horseshoe-shaped nostrils control the rate of mixing of the producer gas and air, and so influence the temperature distribution in the bottom and second passes. The length of each nostril can be varied by the addition or subtraction of nostril tiles. Wedge-shaped bricks are placed immediately in front of the nostril. Within limits, the position of this brick has a definite effect on the bottom temperature. In general, the nearer it is placed to the producer gas inlet the higher the bottom temperature, and, similarly, the steeper the angle the higher the bottom temperature. The brick is set perfectly square with the flue walls, to avoid deflection of the producer gas on to the side walls.

Recuperator blocks

The recuperator blocks are built alongside and adjoining their individual setting, they go from chamber house floor to the charging stage level and are thus able to accommodate the main waste gas flue in that portion of the block below the chamber floor joist level. Producer gas, after passing through the neck dampers in the main flue, enters above the same level, passes through the individual damper and then across the block in an horizontal flue to the back of the chamber nostril. Parallel to this, and above it, another flue arranges for coal gas to be admitted to the nostril from the burners fitted in the front walls of the recuperators.

Secondary air slides are provided for the admission of cold air, which is then preheated. Six flues of each bed have their ascending horizontal air flues heated by descending horizontal waste gas flues on each side, while the two end flues are only heated on one side. The preheated secondary air is admitted to each vertical series of heating flues through either one, two or three ports, known as first, second and third stage air. Dampers are provided to control the relative proportions of secondary air passing from each air downtake and are set to give the required gradient of temperature from the bottom to the top of each chamber.

If cold secondary air is to be used in place of, or additional to, the preheated air, the sight box lids can be used as the points of entry and as the regulating medium.

Top dampers are provided at the top of each recuperator and can be used to distribute the desired quantity of waste gases to each of the waste gas down takes. Main waste gas dampers are in the lower recuperator flues and may be used for day-to-day adjustments.

The main waste gas flue conveys the waste gases from all chambers to the waste heat boiler. It is a steel-cased, brick-lined flue.

Initially, the intermittent vertical chamber ovens were operated on an 11-hour carbonising schedule and there was little reason for any more than day to day minor alterations to individual fuel gas dampers and secondary air slides. Temperatures were taken daily and the results passed on to the technical assistant responsible; on his instructions alterations were made as necessary by the heats' chargehand. General conditions obtaining under these conditions were:—

Fuel gas main pressure, .25 in. w.g.
Neck dampers, 7 in. to 9 in. open.
Individual dampers, 3 in. to 4 in. open.
Air slides, 2 in. to 3 in. open.
Main waste gas pull, .65 in. w.g.

Flue temperatures were maintained at 1,330°C. ± 30° at the bottom and 970°C. ± 30° at the top. This latitude is allowed, having regard to the intermittent operation of the chambers.

Simple heat control needed

It became increasingly obvious during the course of time that, by reason of fluctuating gas demand at week-ends, statutory holidays and particularly annual holidays, some simple method of heat control should be formulated. The requirements were that either the charging schedule would need to be changed to 12, 14, 15, even 18 hours or that gas-making should cease for a period of days or even weeks. Control of the settings under such conditions became rather involved and time absorbing.

A survey of the settings was made during two such periods and from the information gathered a very simple system was evolved.

To change to a 15-hour schedule:

Reduce main waste gas pull to .6 in. w.g. Reduce flue gas main pressure to .23 in. w.g. Commence charging the 12-hour schedule. Adjust neck dampers where necessary to maintain level gauge above the damper.

Eight hours later: Reduce main waste gas pull to .5 in. w.g. Reduce fuel gas main pressure to .2 in. w.g. Adjust neck dampers where necessary to maintain level gauge above the damper.

Four hours later: Commence charging 15-hour schedule. Re-adjust neck dampers where necessary.

It will be found that few, if any, alterations will be necessary to individual fuel gas dampers or air slides, and temperatures will average 1,300°C. at the bottom and 930°C. at the top of the flue.

Shut-down during holidays

To change back to an 11-hour schedule, the reverse routine needs to be applied, except that pull and pressure conditions are altered before the changes in schedule.

To shut down during holiday period:

Eighteen hours before: Commence charging on the 12-hour schedule. Reduce chimney pull to .6 in. w.g. Reduce fuel gas main pressure to .23 in. w.g. Scurfing schedule must be discontinued.

Twelve hours later: Stop charging, maintain discharging on 12-hour schedule. Cease steaming. Chambers to be padded and not left open for scurfing after discharge. Reduce waste gas main pull to .45 in. w.g. Reduce fuel gas main pressure to .2 in. w.g. Adjust neck dampers as necessary to maintain level gauge above dampers.

Six hours later: Reduce neck dampers to 3 in. open and commence reducing individual fuel gas dampers to less than ¼ in. open and air slides to ¾ in. open, as and when charges are dropped out and chambers left off.

Between this time and the time of the last chamber being emptied, one producer is taken off the line, the final main waste gas pull set at .35 in. w.g., and the fuel gas main pressure set at .15 in. w.g. The neck dampers are then finally adjusted to give a level gauge above the damper.

The final conditions and temperatures are:

Fuel gas main pressure, .15 in. w.g.
Neck dampers, 2 in. to 3 in. open.
Individual fuel gas dampers, less than ¼ in. open.
Air slides, ¼ in. open.
Main waste gas pull, .35 in. w.g.
Temperatures at the top of the flue, 820 to 850°C. and at the bottom of the flue, 1,200°C.

To start up after a holiday period:

Eight hours before: Increase waste gas pull to .4 in. w.g
Six hours later: Increase waste gas pull to .45 in. w.g.
Open neck dampers to previous position.
Three hours later: Start charging chambers.

Three hours later: The bench having been put to work and chambers now being charged at hourly intervals, alterations are now made as chambers are charged. Initial positions, individual fuel gas dampers 2½ in. open and air slides 2 in. open. The producer is put back on line during the morning and fuel gas main pressure is regulated to .2 in. w.g.

18 hours schedule

When all chambers have had their initial charge the schedule is changed to 18 hours and from then the procedure is:—

Eighteen hours later: Increase main waste gas pull to .5 in. w.g.

Four hours later: Charge on 15-hour schedule. Adjust neck dampers to maintain level gauge conditions above damper.

Twelve hours later: Increase waste gas pull to .6 in. w.g.

Twelve hours later: Charge on 12-hour schedule. Re-check neck dampers.

Twelve hours later: Charge on 11 or 10½-hour schedule as required. Make final alterations to fuel gas main pressure (.25 in. w.g.) and waste gas main pull (.65 in. w.g.). Adjust neck dampers to maintain level gauge above damper.

Partial coal gas firing has been introduced with the aim of absorbing approximately half the coal gas made at week-ends, while normal coke production is maintained. Certain modifications have had to be made to the plant.

A 24-in. main bringing purified gas from the tower purifiers back to the chamber house, is fitted with an orifice plate and flow recorder. Each bench is provided with a Bryan Donkin diaphragm pressure regulator with 6-in. diameter inlet and bypass connections which controls the clean gas pressure to a 12-in. manifold from which there are 24 2-in. services carrying gas to the heating flues.

Gas enters the settings at the base of the recuperators through a fireclay tube, immediately above the fuel gas flue, and then joins the flue immediately before the nostril.

Over-sensitive

Each flue is provided with a specially designed burner, consisting of a venturi, calibrated orifice and moveable air disc. As originally supplied the gas nozzles of the burners were too large, making control extremely sensitive. The large burners were reduced from 1⅝ in. diameter to 1⅜ in., and the small ones from 1⅜ in. to 1⅛ in. diameter.

Continued on p. 72

GAS JOURNAL April 13, 1960

From a contribution to an Eastern Junior Gas Association short paper competition

Economy in the relaying of gas service pipes

By W. BAINBRIDGE,

DISTRIBUTION SUPERINTENDENT, CAMBRIDGE, EASTERN GAS BOARD.

A RECENT demonstration of a comparatively new type of hydraulic machine designed to extract underground gas service pipes, showed how this could be done with a minimum amount of excavation and subsequent reinstatement, in the shortest possible time. Simultaneously, the new pipe is introduced into the position previously occupied by the old service pipe.

Details of time taken and costs of this demonstration job may be compared with the estimated time and costs had the service been completely renewed using the normal method of breaking up the entire service route.

The Gas Act of 1948 placed upon the gas industry the responsibility of 'maintaining an adequate and satisfactory supply of gas at all times to the premises of those consumers who should require it,' and it goes without saying that the maintenance of this supply should be compatible with economy. This implies the maintenance of service pipes which carry the gas from the distribution mains to the meter position on the consumer's premises.

Deposit combinations

In the course of time, these service pipes become fouled with various deposits such as corrosion, gum, condensate, etc., and, what is even worse, various combinations of these deposits. In many cases they are extremely difficult to remove, even by using a mechanical vacuum clearing machine in conjunction with a strong flexible steel cable, inserted in the service pipe and rotated by the hand drill type of tool.

In addition to this 'internal' problem, service pipes are also subjected externally to attacks of corrosive elements, traffic vibration, ground subsidence and disturbance by other utility services.

When it becomes necessary to renew or enlarge service pipes the cost of reinstatement, particularly on major trunk roads and in built-up areas allied with the cost of breaking up the roadways, constitutes an expensive procedure.

There are many factors which influence the decision as to whether a service pipe should be renewed, part renewed or enlarged, the most important of which are:

1. Internal blockages or leakage of gas from the service pipe.
2. Enlargement and/or extension to the service to give an increased gas supply to serve additional appliances, particularly where large houses are being sub-divided into several flats, or the multipoint type of water heater is to be installed.
3. When policy requires service pipes to be renewed street by street, in an attempt to reduce 'unaccounted for' gas and to eliminate the potential hazard of gas escapes.
4. Over-frequent maintenance visits to 'poor supply' complaints where repeated attempts to provide a satisfactory supply prove to be unsuccessful.
5. Old, worn, unserviceable or unreliable service pipes, particularly those laid in bad ground.

With the present-day high cost of labour and plant, transportation and reinstatement charges, together with the continual ageing of service pipes laid in roadways carrying ever increasing traffic loads, the industry is facing a problem which will increase rather than decrease. This is particularly so in old towns, coal or salt mining areas where ground subsidence is common, and in areas where services are laid in 'made-up' ground of a corrosive nature, *viz.*, ash clinker or extremely corrosive subsoils.

Such problems indicate that speedier and more economical methods of renewing service pipes are highly desirable, and some form of mechanical aid must be sought to help overcome the difficulties. Quite recently, a well-known firm of engineers has developed an ingenious 'pipe extractor machine' which employs hydraulic means to overcome the frictional and obstructional resistance of the underground pipe (and its fittings) during withdrawal. The service pipe is extracted from either one end or the other without opening the whole of the roadway along the length of the pipe.

The machine is robust, self-contained and compact, easily portable, and measures about 25 in. long. It is fitted with a back plate 20 in. high by 12 in. wide, it weighs approximately 65 lb. and lends itself to working in comparatively confined spaces.

'Considerable force'

In construction a hollow ram jack incorporating a three jam chuck at one end and secured to the back plate at the other end is anchored within a robust steel frame, the back plate of which is designed to take the thrust when the machine is in the operating position. A 2-speed hydraulic pump is contained in the ram jack, and is operated by a detachable 'T' shaped lever or handle approximately 40 in. long. The hydraulic pump gives a maximum pressure of 5,000 p.s.i. equivalent to a total load of 5 tons exerted on the chuck when maximum resistance is encountered. This is quite a considerable force to apply to even the most stubborn service pipe. A set of high tensile steel rods (screwed) in 2 ft. lengths is also available, the purpose of which will be explained later. A 3-man team operates the machine according to the following procedure.

First of all the service connection on the main is located by means of an underground pipe locator and the ground excavated down to the main far enough to enable the service pipe to be disconnected and the main plugged. At

When moving the Cobra, the drill steel is carried just clear of the wheel.

When the drill is brought into the vertical position, the wheel automatically swings away from the drill point.

As the surface is penetrated, the carriage swings up allowing the drill to penetrate to maximum depth.

GAS MAIN TESTING?

Look how the Cobra speeds work, reduces costs

The Atlas Copco Cobra is a versatile motor drill which can be operated without any special training. Ideal for mains testing work, it has many advantages for survey crews.

Swift The Cobra drills quickly with a minimum of damage to road surfaces. Normally fitted with tungsten carbide tipped drill steels, it can easily be converted into a breaker for general purpose road-breaking, backfill ramming, etc.

Self-contained There is no hose to obstruct the highway and hamper the operator. No problems about providing sufficient air to power more than one drill. The Cobra has a built-in petrol-driven motor making it completely self-contained.

Saves Labour Weighing only 53 lb. (about 30 lb. less than any comparable machine), the Cobra is perfectly balanced for carrying. For ease of handling it can be fitted with a light, single-wheeled carriage which allows the operator to move the drill from place to place with a minimum of effort.

For further details of the Cobra, contact your local Atlas Copco branch office or get in touch with

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The NEW WORLD Thirty Three introduces a hotplate of advanced design, incorporating entirely new boiling burners and full-width pan rests all made from stainless Steel.

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The hotplate consists of three RADALINE boiling burners of an entirely new design each of a different size so as to give the maximum working space. The pan rests provide a smooth hotplate for the easy movement of pans and kettle. The separate rods which comprise the pan rests are easily removable, and cleaning is simplicity itself.

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leads the way

the same time a hole is dug at the other end of the service pipe in the footpath (or garden, if possible) to accommodate the machine. The 'floor' of this hole should be about 4 ft. below the level of the service pipe, which is then cut so as to leave some 2 ft. of service pipe protruding from the side of the hole to ensure that there is sufficient room for the chuck to obtain a good grip on the pipe.

The desired enlarging head—a 'D' socket of required dimensions is used—is then screwed on the opposite end of the service pipe (nearest the main) and the pipe is then hammered with a 14-lb. sledge hammer from the machine end until a perceptible movement, say, ¼ in. or so, is obtained, along the length of the pipe. *After this movement has been obtained* the machine is then placed in position over the end of the service pipe, the chuck carefully centralised and the machine wedged in position with suitable packing material—should this be necessary.

The pump lever or handle is then inserted to operate on slow speed. When the pipe begins to move easily the higher speed can then be used. The new pipe to be inserted can be attached to the enlarging head and inserted into position as the old pipe is withdrawn. Ten-foot lengths of pipe are found to be convenient lengths, but this can be varied to suit site conditions. Alternatively, the new length of pipe can be hand fed into the newly enlarged hole or heading. If copper pipe is used to replace the old service pipe, it can be inserted in one continuous length, a special adaptor being available to anchor the copper to the enlarging head.

If it is more convenient to do so, the machine position may be reversed, *i.e.*, located at the end nearest the main and the pipe inserted from the opposite end. Site conditions determine the method to adopt.

Should the service pipe fail to move after the initial hammering, the high tensile steel rods are introduced into the service pipe, screwed securely and an adaptor fitted where the rods protrude from the opposite end. This has the effect of clamping the old pipe which can then be extracted using the machine in the normal way. This method is particularly useful where service pipes are in very poor condition and subject to collapse on initial hammering. If no movement can be obtained by hammering alone, the machine can be attached and an additional pull applied as the hammering continues.

In extreme cases where the pipe absolutely refuses to move in spite of this combined force, it is necessary to excavate another hole say, half way along the service between the severed ends and another attempt made to dislodge the pipe. It has been known that tees and even disused branch connections have prevented movement of the pipe, but when the machine has been re-positioned at least half of the pipe has been removed and sometimes the whole service.

The most important thing to remember is that the function of the machine is to avoid extensive road breaking and subsequent reinstatement charges, and to cause the minimum disturbance to the flow of traffic where the crossings of busy thoroughfares are being undertaken.

The possibilities of this technique can be readily appreciated and reports from districts where this type of machine is in use are favourable. The manufacturers claim over 90% success of all services tackled to date, which is a very impressive performance. The total cost of the machine, with accessories, is less than £200 and this capital outlay could be recovered by successful renewal of 25 or 30 services at an average cost of about £7 per service effected.

A 3-man team can comfortably renew twice as many services of about 30 to 40 ft. each per day including road crossings, compared to normal practice if given reasonable conditions; this constitutes a considerable saving in time, expense and effort. Where services are being renewed street by street, a six-man team using one machine have completed four renewals per day adopting the leap-frog method of co-ordinating the various operations.

Heat control of I.V.C. settings—from page 67

For operational purposes it is desirable to leave some producer gas going forward to the settings in order to keep the fuel gas main under producer gas pressure, ready for a quick return to producer gas underfiring. At present 5% total heat input to a bench can be replaced by coal gas.

The time to make the changeover for producer gas to coal gas is 30 to 40 minutes, and coal gas to producer gas is 15 to 20 minutes.

The procedure for changing over from producer gas firing to partial rich gas firing can be summarised as follows:

Reduce neck dampers to openings of 2½ in.
Reduce individual fuel gas dampers to openings of ¼ in.
Reduce air slides to openings of 1 in.
Open all 'V' box sight holes on the front of the setting.
Turn on three gas burners, maintaining a pressure of 2.7 in. w.g. in the rich gas main by regulating the governor by-pass valve.
Open the outlet governor valve.
Open the inlet governor valve and at the same time close the by-pass valve maintaining 2.7 in. w.g. gas pressure in the rich gas main.
Turn on the remainder of the gas burners.
Open inspirator air discs 1½ turns.
Maintain the draught in main waste gas flue as for producer gas firing.

A comparison of the results over a period of 24 hours with producer gas underfiring and coal gas underfiring shows how the net gas production for distribution may be reduced.

Four benches at work	Producer Gas Underfiring	Coal gas Underfiring
Carbonising period	11 hours	11 hours
Coal gas make ('000 cu.ft.) ..	7,234	6,818
Producer gas dilution ('000 cu.ft.)	1,195	1,063
Combined make ('000 cu.ft.) ..	8,429	7,881
Coal gas underfiring ('000 cu. ft.)	Nil	3,360
Gas available for distribution ('000 cu.ft.)	8,429	4,521
Coke to producers (tons) ..	96	31
Estimated coke for producer gas dilution (tons)	8	7
Nett coke for heating settings (tons)	88	24
Coal carbonised (tons)	571	537
Total coke made (tons) ..	422	396
Total to producers (tons) ..	96	31
Coke ex retort house	326	365

The methods set out in the paper have proved to be highly successful in their object to reduce technical supervision without detriment to safe control. Instructions may quite confidently be left in the hands of a general shift foreman, the need for a shift heat attendant being obviated.

NABARRO GROUP UNDER FIRE

M.P. hits at 'these baseless criticisms' of state services

NEWS SUPPLEMENT

A SLASHING attack on the 'unofficial Opposition' created by Mr. Gerald Nabarro and his supporters was made by a Labour Member, Mr. George Darling, who was defending the nationalised industries during the debate on the Budget in the Commons last week. He said: 'This constant sniping at our public industries has now gone so far as to become almost a succession of charges of negligence, incapacity and inefficiency directed against the public servants that we have put in charge of those industries.

'These baseless criticisms of public servants who are not in a position personally to reply reflect no credit upon the hon. Member and his friends.

'However,' he went on, 'I look forward to the debates which he has promised to initiate, because I am convinced—and I say this with all the emphasis that I can—that we shall have no difficulty in showing that our public service industries are well-managed, efficient and, in the circumstances in which they have to operate, highly-successful.'

His prophesy

Earlier, Mr. Darling made reference to the gas industry in particular. 'I remember when I first got up as a backbencher some eight years ago and said that the only way to avoid a coal and fuel crisis, which I felt would come from a too-great dependence on imported oil, was to make full use of our indigenous fuel resources and to put a great deal of money quickly into the building of carbonisation plants so that we could get full value from the coal and a great increase in gas production.

'I suggested then that we should put the country on a gas grid, so that as many industries as possible could take gas for their power fuel, which is a possible technical development.

'I was going to ask the hon. Member for Kidderminster whether I was correct in my recollection that when I was putting forward those views he supported me with his usual vociferous "hear, hears."'

Mr. Nabarro was not present during the speech.

Out of accord

Mr. Darling said that to suggest that expenditure on the nationalised industries should be cut down was completely out of accord with the picture presented today—of a country whose industrial resources were stretched to the limit. 'We must have far more investment in these industries in order that our industrial expansion can continue.'

Mr. Darling said Mr. Nabarro had threatened an attack on the nationalised industries in the debates on the Finance Bill.

Members on the Opposition side of the Committee were not altogether happy about the present methods of financing public service industries.

'But I will tell the hon. Member for Kidderminster and his friends—the 'unofficial Opposition,' as he describes it—that before we consider any of his proposals we want an honest disclosure of the motives behind these attacks on the nationalised industries.'

ORDER CONFIRMED

The Secretary of State for Scotland has confirmed orders making Pollokshaws, Glasgow, a smoke-controlled area and extending the smoke-control area in the city centre. Almost 9,000 houses will be affected in Pollokshaws and 2,400 houses in the extensions east and west of the city area. The order comes into effect on October 15.

NALGO branch dinner

'We are going to win the fight'

THE Hull Group Gas Branch of NALGO, holding their 9th annual dinner on March 31, heard Mr. A. Cole, Group General Manager, say: 'We have reorganised during the last 12 months and we are going into this fuel battle to win. The temporary setbacks of the last 18 months are going to be temporary.'

Mr. C. L. Davies, Industrial Relations Officer, N.E.G.B., said the difficulties he had to deal with were relatively few so far as Hull was concerned. He added: 'And we need all the co-operation we can get in these difficult days.'

Sir Henry Jones, Chairman of the Gas Council (extreme left in picture), attended the annual banquet of the Newport and Monmouthshire Chamber of Commerce recently. He said that the work already carried out by the Wales Gas Board in the laying of 720 miles of mains would enable a link-up with a national gas grid when this came into being. The mayor, Councillor Edwin Aston (second left), said that the steelworks and other developments would result in great changes in the area. Others in our picture are: (Centre) Lord Raglan, Lord Lieutenant of Monmouthshire, Brigadier-general G. B. Vaughan Hughes, and Mr. A. H. Dyer, Chamber President.

Overseas news

Power station on Upper Volga will be fired by natural gas

A BIG gas-fuelled power station will be built next year on the banks of the Upper Volga, some 70 miles from Moscow. It will take two years to build and will be named Konakovskaya, after a nearby town.

The station will be fuelled by natural gas from a circuit pipe-line now laid around Moscow which will be connected to the rich deposits of the North Caucasus and the Ukraine. It is estimated that the station will use more natural gas than is now consumed by Moscow and Moscow region taken together.

To be built of prefabricated structural units assembled on the spot, the station will produce electricity at a cost 50-60% lower than at other Soviet thermal stations and at no more than the cost of current transmitted from Stalingrad and other Volga stations over the high-tension power lines.

The project provides for the use of electronic devices and programme-operated units which automatically select the best mode of operation for steam boilers and turbines.

The station will supply power to several areas of the central and north-western part of the U.S.S.R. in Europe, including Moscow and Leningrad, and will make it possible, in particular, to complete the electrification of the 400-mile Moscow-Leningrad railway line.

C.G.A. attack on hydro chief

MR. W. H. DALTON, Managing Director of the Canadian Gas Association, has denounced as 'unrealistic' recent comments made by an official of the Ontario Hydro-Electric Power Commission to the effect that increased sales of natural gas would lower municipal revenues and cause an increase in the cost of electricity. 'I cannot conceive of a more unrealistic approach to competition than that outlined by executives of Ontario Hydro,' said Mr. Dalton.

He said that aggressive sales campaigns the world over had proved beyond any doubt that it was the consumer who benefited most in the long run. 'He benefits from more economical and better products at cheaper rates. He benefits from research and development.'

Mr. Dalton concluded: 'No drop in the sales of natural gas is going to decrease electricity costs.'

BITUMINOUS SHALE FOR GAS MAKING

ACCORDING to a report in the Brazilian Press a group of Russian technicians, under contract with the Cia. Industrial de Rocha Bituminosa, is advising on the building of a plant in the Paraiba valley. The company has extensive bituminous shale deposits there.

Using bituminous slate as a base, the plant will produce gas for industrial and domestic use, raw materials for synthetic rubber, fertilisers, electric energy and chemicals. It is estimated that gas production may reach 2 mill. cu.m. per annum within two years.

CANADIAN NATURAL GAS SALES, REVENUE AND CUSTOMERS 1950 - 1959

Year	Sales		Customers (thousands)	Revenues ($ thousands)
	Mill. cu. ft.	Percent inc. 1950=100		
1950	44,335	100·0*	224	15,971
1951	65,056	146·8	252	24,220
1952	66,133	149·2	263	27,102
1953	70,868	159·8	283	30,167
1954	87,467	197·3	310	36,141
1955	117,800	265·7	484	55,181
1956	143,726	324·2	514	64,652
1957	168,783	380·7	646	83,164
1958	206,553	465·9	1,033	114,946
1959	282,358	636·9	1,063	159,627

* The 1950 total is taken as a base of 100 for calculating the accumulative annual percentage increase in gas sales.

Flashes

WILDCAT OIL AND GAS SEARCH IN NEW ZEALAND

OIL will be sought on the east coast of New Zealand's North Island in a valley near Morere where gas and oil traces were found 30 years ago. The well was expected to be spudded-in by the end of March, and it would probably take the best part of a year to complete. Oil experts describe the venture as 'much more wildcat' than the search at Kapuni, in Taranaki, where an intense geophysical survey was possible. The east coast country is much more difficult to survey, but oil and oil-gas traces seep from scores of places.

* * *

The deepest oil well in Europe and Asia—4,834 metres, about three miles—has been completed in the Padar Valley, on the shore of the Caspian Sea to the south of Baku. The well was drilled with a turbo-drill. Intensive exploration work is going on in the Padar Valley, where a promising oil and gas pool has been discovered.

* * *

The Loma Negra company at Barker, Buenos Aires Province, Argentina, will in future use natural gas as fuel in its cement plants. It is hoped to carry out the conversion from petroleum to natural gas with the company's own resources, but possibly with a credit obtained from the Banco Industrial.

* * *

The merger has been announced of three Israeli oil prospecting firms who will embark on a two-year, I£14 mill. drilling programme. It has also been stated that natural gas at the new site at Zohar, south-east of the Dead Sea, continues to flow at high pressure.

* * *

The Soviet foreign trade organisation Promsyrye-export has completed negotiations with West Germany on the delivery of a big consignment of large-diameter gas pipes to the US.S.R. this year.

* * *

An order from Russia worth £10,000, for the supply of small vacuum insulated liquid oxygen storage tanks, has recently been completed by British Oxygen Engineering, Ltd.

* * *

White Eagle Overseas Oil Company recently completed drilling its first test-well on north-west Leyte, the Philippines. Oil in small quantities and gas were found.

* * *

In 1959 the Netherlands State Mines' gas distribution plant sold 387 mill. cu.m. (13,545 mill. cu.ft.) of gas.

GAS INTEGRALE PLANT SOLVES DEMAND PROBLEM FOR CITY IN BLACK FOREST

RISING gas consumption by the City of Freiburg, Southern Baden, in the Black Forest, Western Germany, has made necessary an expansion of gas-making capacity at the local municipal works.

Independent

With few industrial plants in the city burning coke and reduced demands for solid fuel by central heating units because of the greater number of oil-fired boilers installed recently, it was essential that any increase in gas production should be independent of further coke production.

Local supplies of natural gas were insufficient for the city's immediate needs and oil as a raw material for gas making was too expensive.

Similarity

After consideration of all available systems, a G.I. plant (Gas Integrale system) was installed similar to that built at the Kensal Green works of the North Thames Board.

At the present time, the daily gas production at Freiburg amounts to 80,000 cu.m. (2.8 mill. cu.ft.) 45% of which involves no production of coke.

India's first tonnage oxygen plants near completion

INDIA'S first tonnage oxygen plants, specially designed to serve the new steelworks at Rourkela and Durgapur, are now nearing completion. Apart from providing oxygen for the steelworks, the plants also supply pure nitrogen which, with hydrogen from the coke-oven gas, will produce ammonia by synthesis for the manufacture of fertilisers.

At the Rourkela steelworks, which is German built, three oxygen plants, with a total capacity of 300 tons per day, have been erected to the order of Hindustan Steel, Ltd., Calcutta. The first was commissioned in mid-December, 1959. The other plants at Durgapur and Rourkela will all be commissioned within the next few weeks.

These tonnage plants were supplied by British Oxygen Linde, Ltd., a sales company owned jointly by the British Oxygen Co., Ltd., and Gesellschaft für Linde's Eismaschinen A.H. The orders are worth a total of nearly £2 mill.

Gas sales drop 'alarming'

AT a meeting of the North Eastern Gas Consultative Council in Leeds, Alderman Sir Harry Hardy, of Morley, who described the reduction in gas sales as 'alarming,' asked what steps were being taken to combat the intensive sales campaign of the National Coal Board.

He said that gas consumption in the North East area was down by 3.9% over the previous year, and there were now 9,112 fewer meters in use.

County Alderman Harry Sutcliffe, Chairman, commenting on the drop in gas consumption during the last three years, declared that there was a state of mind approaching animosity in some quarters towards the gas industry.

He said the major factor in reduced demand had been the demolition of slum property. People were being re-housed in areas where street lighting, power and heating was all-electric. The sales of gas appliances, however, had increased.

Effluent exhibition and convention

AN exhibition and convention dealing with effluent and water treatment is to be held at the Seymour Hall, London, W.1, on October 18-21.

Details can be obtained from Thunderbird Enterprises Ltd., 140, Cromwell Road, London, S.W.7.

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Lords debate on the price of gas and coke

Ex-fuel minister defends management

CRITICISMS of the price of gas and coke were made during the second reading of the Gas Bill in the House of Lords last week.

Lord Dalton expressed surprise that nothing had been said in the Commons about the price of gas. Before nationalisation, he said, if a gas company desired to increase dividends to shareholders, this was permissible only if there was a corresponding reduction in the price of gas to the consumer.

Lord Hawke could not understand how the present price of coke was justified. 'It is at least five times the pre-war price; and from the last annual report we see that, whereas sales of gas produced 66% more cash over the last ten-year period, coke receipts have gone up 80%.

Three complaints

Lord Greenhill said the several different kinds of coke and smokeless fuel appeared to take up considerable space and to attract high moisture-content.

A third fault was that if the flue did not work properly there was a danger of carbon monoxide coming into the room. 'On the whole, one is given the feeling that this attractively-advertised but dangerous piece of domestic furniture needs very careful handling.'

Lord Douglas of Barloch said: 'It is well known that coke which is sold to the consumer frequently contains a large amount of water—I am told that in some cases it may be as much as 30% or 40% of the weight—and the consumer has to pay for that as if it were fuel.'

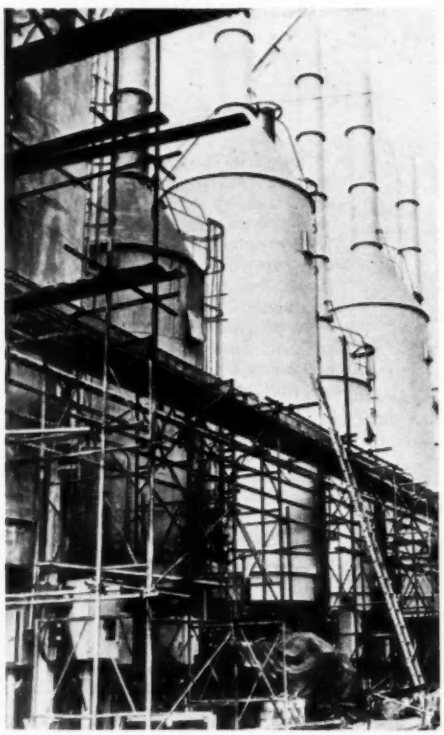
'A good job'

Lord Mills, Paymaster-General, replying to the debate, said the first duty of the gas industry was to see that it did not become a burden to the state. Therefore, it had to arrange its tariffs to sell the maximum volume of gas and coke and remain competitive, 'and I think the industry has done a good job of work in this respect.'

The relationship between the price of gas and the price of coke was a matter for the commercial judgment of the industry itself. The consumer's interest was taken care of by the consultative councils to which alterations of prices were submitted.

'The question of the consumer is never away from the minds of the management of the gas boards. After all, they have to live on the consumer, and unless they satisfy the consumer they will not succeed.'

HEAD WRIGHTSON FORMS DIVISION



Upshot heaters typical of the equipment supplied by the Industrial Furnace Division of Head Wrightson Processes Ltd.

HEAD Wrightson Processes Ltd., has formed an Industrial Furnace Division at its London offices, 20-24 Old Street, London, E.C.1.

Many designs of furnaces for the chemical and petroleum industries are marketed by the firm for specialised types of duty, but of particular interest are the Convetube upshot heaters, which can be fired by either gas or oil.

These are individually designed to meet a wide variety of industrial applications ranging in heat absorption duties from 300,000 to over 60 mill. B.t.u. per hour. Heat is transferred from the combustion gas by radiation and convection fluid passing through the tubes located around the walls of the heater.

The heat transfer rate in the patented convector is similar to that in the radiant section and the fluid is thus evenly heated during its passage through the furnace.

International Furnace goes to Hingley Group

N. HINGLEY & SONS LTD. has acquired from Woodall-Duckham Construction Co. Ltd. its holding of the share capital of the International Furnace Equipment Co. Ltd. which has now become a wholly-owned member of the Hingley Group of Companies.

Collaboration between Woodall - Duckham Construction Co. Ltd. and the International Furnace Equipment Co Ltd. will continue in connection with installations of G.I. complete gasification plant and G.I. coal producers.

APPLIANCES LIST

The Gas Council's fourth edition of its *List of Tested and Approved Gas Catering Appliances* is now available free of charge from area gas board offices and showrooms. First published in 1956 it is issued as a companion publication to the Council's domestic appliance list. All the appliances on the list have been tested in accordance with British Standard 2512 (1954), 'Gas Heated Catering Equipment.'

POWELL DUFFRYN

Powell Duffryn Ltd. has acquired the whole of the share capital of Kelmac Ltd., which owns a limestone quarry about 30 miles North of Preston and produces a wide range of high grade limestone products, including dry and wet mixed graded limestone for road works, bituminous and tarred macadam, concrete aggregate, and material for the manufacture of chemical fertiliser. Mr. Robert Hopwood is Chairman of the company.

TEENAGE GAS CLUB

The 'Saturday Teenagers' Therm Club' has held its first meeting at the Wales Gas Board offices in Newport, Mon. The club, which is sponsored by the Wales Gas Board and was organised by Mr. Harry Emmony, the Board's Sales Manager in Newport, caters for girls and boys between the ages of 12 and 16.

Members meet every Saturday for film shows, talks and demonstrations. A free badge and membership card are given on enrolment.

COMING EVENTS

April 21.—EASTERN JUNIORS: Cambridge. Visit to gasworks and paper by B. Santo.

April 22.—NORTHERN JUNIORS: Newcastle-upon-Tyne. Special speaker meeting.

April 25.—EASTERN G.C.C.: Connaught Rooms, Great Queen Street, London, W.C.2. 2 p.m.

April 26.—INSTITUTION OF PLANT ENGINEERS: South Wales Engineers' Institute, Park Place, Cardiff. 'Heating and Air Treatment in Industry,' by A. A. Field.

April 26. — SOCIETY OF INSTRUMENT TECHNOLOGY, CONTROL SECTION: Manson House, 26, Portland Place, London, W.1. Annual general meeting and 'Some Recent Advances in Industrial Electrical Control Techniques,' by T. E. Barany. 6.15 p.m.

April 26.—MIDLAND JUNIORS: Birmingham. Annual general meeting followed by address by Dr. Mary Woodall.

April 27. — MANCHESTER JUNIORS: Radiant House, Liverpool. 'An Investigation Into the Use of Gas for Drying and Pre-heating Foundry Ladles,' by K. G. Rhodes and G. Holmes.

April 27.—YORKSHIRE JUNIORS: Rotherham. President's Day. Visit to Car House works.

April 28.—NORTH OF ENGLAND SECTION, I.G.E.: Three Tuns Hotel, Durham. Joint meeting with the Coke Oven Managers' Association, Northern Section. Paper on 'Centralised Control in a Modern Coke Oven Plant,' by M. D. Edington and H. Millner.

April 28. — LONDON AND SOUTHERN JUNIORS: Visit to Broom & Wade Ltd., High Wycombe.

April 28.—LONDON AND COUNTIES COKE SALES CIRCLE: Connaught Rooms, London. Brains trust on appliance testing. 2.30 p.m.

April 29.—SCOTTISH WESTERN JUNIORS: St. Enoch's Hotel, Glasgow. Annual general meeting.

April 29.—MIDLAND SECTION, I.G.E.: Hotel Leofric, Coventry. Annual general meeting, preceded by luncheon at 12.45 p.m.

April 29. — LONDON AND SOUTHERN JUNIORS: Westminster Technical College, Vincent Square, London, S.W.1. 'A Comparison of Results Obtained in the Catalytic Gasification Plants in the Southern Gas Board,' by M. J. Birch and H. J. Lockwood. 6.30 p.m.

April 29.—COKE OVEN MANAGERS' ASSOCIATION, SOUTHERN SECTION: Park Hotel, Park Place, Cardiff. 'Progress in Benzole Refining,' by T. Scott.

May 4.—INSTITUTION OF PLANT ENGINEERS: Polygon Hotel, Southampton. 'Insulation of Buildings,' by J. Churton. 7.30 p.m.

Consultative Council hears quarterly progress report

SOUTHERN GAS BOARD'S GRID SYSTEM NOW IN OPERATION

IN its bulletin to the Southern Gas Consultative Council for the quarter ended December 31, 1959, the Board has given more details about the area gas grid network.

Gas is now being moved between the various grid sections—Poole, Southampton, Portsmouth, Reading and Oxford.

Daily averages

During the quarter Southampton supplied up to a maximum of 6½ mill. cu.ft. of gas per day to the Portsmouth Region and 1½ mill. cu.ft. per day to the Reading grid, including the Newbury district. Gas supplied by Reading to the Oxford Region increased to a daily average of over 8 mill. cu.ft.

Twenty-eight miles of main were laid during the quarter and one mile disconnected, bring the total length of mains in use at December 31 to 5,997 miles.

The report states that the warm weather throughout the period (the mean temperature during the quarter was 2.4° higher than during the same quarter of 1958) was a factor in decreases of both gas and coke sales to domestic customers. Gas Sales to industrial customers continued their upward trend and showed an improvement of 8.3%.

Efficiency snag

An important cause of lower domestic gas consumption, says the Board, was the upward surge in the sales of new and more efficient gas appliances, giving better results for the use of less gas. The net increase in services laid during the quarter was 3,047.

After the phenomenal increase of 52.5% recorded in appliances sales at the end of 1958 some levelling out was inevitable. Cooker sales were 5% less than the exceptional figures for the same quarter of 1958, but fire and radiator sales improved by 17.8% and gas refrigerator sales by 24.6%.

At Reading, Gastechnik gas purifiers and associated sulphur extraction plant were completed and started work in mid-December. These purifiers work on a principle, not previously used in the Southern area, in which gas is purified by passing it through towers containing iron-oxide pellets.

OBITUARY

MR. CONNOR HENRY GILBERT, who was Exeter district manager of the South Western Gas Board, has died aged 60. Early in his career, Mr. Gilbert was with the South Metropolitan Gas Company and Smethwick Corporation Gas Department, after which he held an appointment with General Gas Appliances Ltd., Manchester, from 1927-40. He served with Swindon United Gas Company as sales development officer from 1940 until vesting date, when he became commercial assistant, Swindon, South Western Gas Board. He was appointed district manager, Exeter, in 1954. For his funeral service, which took place on April 4, a request was made for donations for the World Refugee Fund, rather than flowers.

Shorter week for maintenance men

AT a meeting held between the Gas Council and representatives of the Confederation of Shipbuilding and Engineering Unions, it has been agreed that the normal weekly working hours of all maintenance craftsmen employed in the gas industry should be reduced to 42 without loss of pay as from May 1, 1960.

An application for an increase in the wages of maintenance craftsmen was rejected.

PERSONAL NOTES

MR. SIDNEY EDWARDS, sales and service manager of the Dorset and Bournemouth Region, Southern Gas Board, is to retire after 50 years' service in the gas industry. Pending the appointment of a successor, MR. D. M. FOULIS will act as Sales and Service Manager for the Region. Mr. Foulis is at present Administrative Assistant to the Board's Commercial Manager, MR. W. H. ELKERTON. Mr. Edwards joined the Birkenhead Corporation Gas Department in 1910, and appointed assistant to the distribution and sales superindent of the Southampton Gas Light and Coke Company in 1932. In 1936 he was promoted to sales manager. In the same year he won the Goodenough Gold Medal for the best paper presented to any of the industry's sales and service circles. Early in 1956 Mr. Edwards was appointed domestic and commercial sales officer of the Southern Gas Board and later in that year took up his apointment as sales and service manager of the Board's Dorset and Bournemouth Region.

MR. JAMES WILSON, who retired last month after being distribution superintendent for Stevenston, Saltcoats, Ardrossan, and West Kilbride was presented with retirement gifts from colleagues at a function in Saltcoats recently. Mr. Wilson joined the gas industry in 1914.

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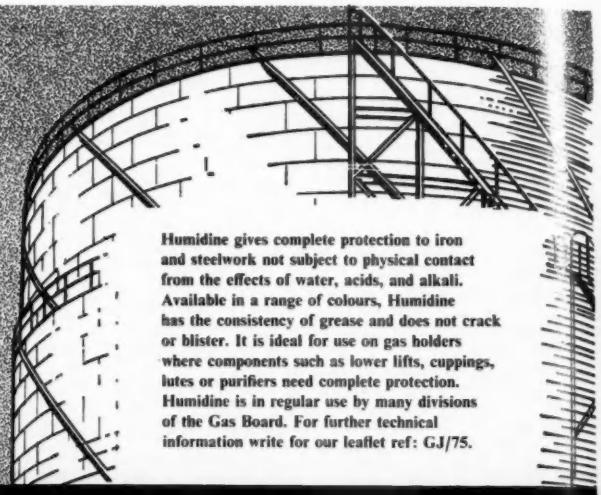

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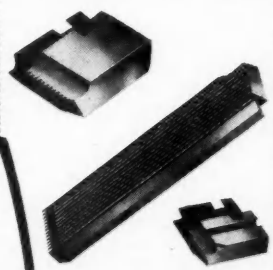

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